Mr. Kenny McCleary
Eli Lilly and Company
P. O. Box 685
Lafayette, Indiana 47905

Re: Minor Source Modification No:157-11183-00006

Dear Mr. McCleary:

Eli Lilly and Company, Tippecanoe Laboratories, located at 1650 Lilly Road, Shadeland, Indiana, applied for a Part 70 operating permit (TV157-6879-00006) on October 10, 1996 for a pharmaceutical manufacturing plant. An application to modify the source was received on July 29, 1999. Pursuant to 326 IAC 2-7-10.5 the following emission units are approved for construction at the source:

> The installation of new process tanks, identified as Gen'l Tank 33-1, with a capacity of 2,000 gallons, for a like-kind replacement of the old process tank; Gen'l Tank 43-1 with a capacity of 1,000 gallons, to replace a 750 gallon process tank; and a portable process Gen'l Tank PT-3 with a capacity of 100 gallons. The volatile organic compounds (VOC) emissions from these tanks will be controlled by the existing Regenerative Thermal Oxidizer (RTO) permitted under Construction Permit CP157-1980 or the condensers.
>
> The point source emissions from the process vessels may vent directly to the RTO, or they may first vent to scrubbers, process control condensers, vacuum sources, or through other process vessels before going to the RTO. If venting the process vessel to the RTO would cause a safety concern, the process vessels may vent to an alternative pollution control device. Also, in the event that the RTO is unavailable, Lilly would continue manufacturing operations in the process vessels using other existing pollution control equipment that complies with 326 IAC 8-5-3. The carbon monoxide emissions from these replacement tanks will be voluntarily controlled by the RTOs. The sulfur dioxide emissions from these replacement tanks will be voluntarily controlled by scrubbers. The nitrogen oxides emissions from these replacement tanks will be voluntarily controlled by scrubbers.

The proposed Minor Source Modification approval will be incorporated into the pending Part 70 permit application pursuant to 326 IAC 2-7-10.5(l)(3). The source may begin operation upon issuance of the source modification approval.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter call (800) 451-6027, press 0 and ask for Aida De Guzman or extension 3-4972, or dial (317) 233-4972.

Sincerely,

Paul Dubenetzky, Chief
Permits Branch
Office of Air Management

Attachments
APD
cc: File -Tippecanoe County
U.S. EPA, Region V
Tippecanoe Health Department
Air Compliance Section Inspector - Eric Courtright
Compliance Data Section - Karen Nowak
Administrative and Development - Janet Mobley
Technical Support and Modeling - Michele Boner

PART 70 MINOR SOURCE MODIFICATION
OFFICE OF AIR MANAGEMENT

Eli Lilly and Company
1650 Lilly Road
Shadeland, Indiana 47905

(herein known as the Permittee) is hereby authorized to construct and operate subject to the conditions contained herein, the emission units described in Section A (Source Summary) of this approval.

This approval is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-7 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Minor Source Modification No.:157-11183-00006	
Issued by: Paul Dubenetzky, Branch Chief Office of Air Management	Issuance Date:

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SECTION A SOURCE SUMMARY

This approval is based on information requested by the Indiana Department of Environmental Management (IDEM), Office of Air Management (OAM). The information describing the emission units contained in conditions A.1 through A.2 is descriptive information and does not constitute enforceable conditions. However, the Permittee should be aware that a physical change or a change in the method of operation that may render this descriptive information obsolete or inaccurate may trigger requirements for the Permittee to obtain additional permits or seek modification of this approval pursuant to 326 IAC 2, or change other applicable requirements presented in the permit application.

A.1 General Information [326 IAC 2-7-4(c)] [326 IAC 2-7-5(15)]

The Permittee owns and operates a pharmaceutical manufacturing plant.

Responsible Official:	Kenny McCleary
Source Address:	1650 Lilly Road, Shadeland, Indiana 47905
Mailing Address:	P. O. Box 685, Lafayette, Indiana 47902
Phone Number:	765-477-4006
SIC Code:	2834 & 2879
County Location:	Tippecanoe
County Status:	Attainment for all criteria pollutants
Source Status:	Part 70 Permit Program Existing Major, under PSD Rules; Major Source, Section 112 of the Clean Air Act

A.2 Emission Units and Pollution Control Equipment Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(15)]

This Pharmaceutical Manufacturing source is approved to construct and operate the following emission units and pollution control devices:

The installation of new process tanks, identified as Gen'l Tank 33-1, with a capacity of 2,000 gallons, for a like-kind replacement of the old process tank; Gen'l Tank 43-1 with a capacity of 1,000 gallons, to replace a 750 gallon process tank; and a portable process Gen'l Tank PT-3 with a capacity of 100 gallons. The volatile organic compounds (VOC) emissions from these tanks will be controlled by the existing Regenerative Thermal Oxidizer (RTO) permitted under Construction Permit CP157-1980 or the condensers.

The point source emissions from the process vessels may vent directly to the RTO, or they may first vent to scrubbers, process control condensers, vacuum sources, or through other process vessels before going to the RTO. If venting the process vessel to the RTO would cause a safety concern, the process vessels may vent to an alternative pollution control device. Also, in the event that the RTO is unavailable, Lilly would continue manufacturing operations in the process vessels using other existing pollution control equipment that complies with 326 IAC 8-5-3. The carbon monoxide emissions from these replacement tanks will be voluntarily controlled by the RTOs. The sulfur dioxide emissions from these replacement tanks will be voluntarily controlled by scrubbers. The nitrogen oxides emissions from these replacement tanks will be voluntarily controlled by scrubbers.

A.3 Part 70 Permit Applicability [326 IAC 2-7-2]

This Pharmaceutical manufacturing source has submitted a Part 70 permit application TV157-6879-00006 on October 10, 1996, pursuant to 326 IAC 2-7-2 (Applicability) because:

(a) It is a major source, as defined in 326 IAC 2-7-1(22);

(b) It is a source in a source category designated by the United States Environmental Protection Agency (U.S. EPA) under 40 CFR 70.3 (Part 70 - Applicability).

SECTION B GENERAL CONSTRUCTION CONDITIONS

B.1 Permit No Defense [IC 13]

This approval to construct does not relieve the Permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.

B.2 Definitions [326 IAC 2-7-1]

Terms in this approval shall have the definition assigned to such terms in the referenced regulation. In the absence of definitions in the referenced regulation, any applicable definitions found in IC 13-11, 326 IAC 1-2 and 326 IAC 2-7 shall prevail.

B.3 Effective Date of the Permit [IC13-15-5-3]

Pursuant to IC 13-15-5-3, this approval becomes effective upon its issuance.

B.4 Revocation of Permits [326 IAC 2-1.1-9(5)]

Pursuant to 326 IAC 2-1.1-9(5)(Revocation of Permits), the Commissioner may revoke this permit if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.

SECTION C GENERAL OPERATION CONDITIONS

C.1 Certification [326 IAC 2-7-4(f)] [326 IAC 2-7-6(1)]

(a) Where specifically designated by this approval or required by an applicable requirement, any application form, report, or compliance certification submitted under this approval shall contain certification by a responsible official of truth, accuracy, and completeness. This certification, and any other certification required under this approval, shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

(b) One (1) certification shall be included, on the attached Certification Form, with each submittal.

(c) A responsible official is defined at 326 IAC 2-7-1(34).

C.2 Preventive Maintenance Plan [326 IAC 2-7-5(1),(3) and (13)] [326 IAC 2-7-6(1) and (6)] [326 IAC 1-6-3]

(a) If required by specific condition(s) in Section D of this approval, the Permittee shall prepare and maintain Preventive Maintenance Plans (PMP) within ninety (90) days (this time frame is determined on a case by case basis but no more than ninety (90) days) after issuance of this approval, including the following information on each facility:

(1) Identification of the individual(s) responsible for inspecting, maintaining, and repairing emission control devices;

(2) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions;

(3) Identification and quantification of the replacement parts that will be maintained in inventory for quick replacement.

If due to circumstances beyond its control, the PMP cannot be prepared and maintained within the above time frame, the Permittee may extend the date an additional ninety (90) days provided the Permittee notifies:

Indiana Department of Environmental Management
Compliance Branch, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

(b) The Permittee shall implement the Preventive Maintenance Plans as necessary to ensure that lack of proper maintenance does not cause or contribute to a violation of any limitation on emissions or potential to emit.

(c) PMP's shall be submitted to IDEM, OAM, upon request and shall be subject to review and approval by IDEM, OAM.

C.3 Permit Amendment or Modification [326 IAC 2-7-11] [326 IAC 2-7-12]

(a) The Permittee must comply with the requirements of 326 IAC 2-7-11 or 326 IAC 2-7-12 whenever the Permittee seeks to amend or modify this approval.

(b) Any application requesting an amendment or modification of this approval shall be submitted to:

Indiana Department of Environmental Management
Permits Branch, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

Any such application should be certified by the "responsible official" as defined by 326 IAC 2-7-1(34) only if a certification is required by the terms of the applicable rule

(c) The Permittee may implement administrative amendment changes addressed in the request for an administrative amendment immediately upon submittal of the request. [326 IAC 2-7-11(c)(3)]

C.4 Opacity [326 IAC 5-1]

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this approval:

(a) Opacity shall not exceed an average of forty percent (40%) in any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.

(b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

C.5 Operation of Equipment [326 IAC 2-7-6(6)]

All air pollution control equipment listed in this approval and used to comply with an applicable requirement shall be operated at all times that the emission units vented to the control equipment are in operation.

C.6 Stack Height [326 IAC 1-7]

The Permittee shall comply with the applicable provisions of 326 IAC 1-7 (Stack Height Provisions), for all exhaust stacks through which a potential (before controls) of twenty-five (25) tons per year or more of particulate matter or sulfur dioxide is emitted by using good engineering practices (GEP) pursuant to 326 IAC 1-7-3.

Testing Requirements [326 IAC 2-7-6(1)]

C.7 Performance Testing [326 IAC 3-6]

(a) All testing shall be performed according to the provisions of 326 IAC 3-6 (Source Sampling Procedures), except as provided elsewhere in this approval, utilizing methods approved by IDEM, OAM.

A test protocol, except as provided elsewhere in this approval, shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

no later than thirty-five (35) days prior to the intended test date. The Permittee shall submit a notice of the actual test date to the above address so that it is received at least two weeks prior to the test date.

(b) All test reports must be received by IDEM, OAM within forty-five (45) days after the completion of the testing. An extension may be granted by the Commissioner, if the source submits to IDEM, OAM, a reasonable written explanation within five (5) days prior to the end of the initial forty-five (45) day period.

The documentation submitted by the Permittee does not require certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

C.8 Compliance Monitoring [326 IAC 2-7-5(3)] [326 IAC 2-7-6(1)]

Compliance with applicable requirements shall be documented as required by this approval. The Permittee shall be responsible for installing any necessary equipment and initiating any required monitoring related to that equipment, no more than ninety (90) days (this time frame is determined on a case by case basis but no more than ninety (90) days) after receipt of this approval. If due to circumstances beyond its control, this schedule cannot be met, the Permittee may extend the compliance schedule an additional ninety (90) days provided the Permittee notifies:

Indiana Department of Environmental Management
Compliance Branch, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

in writing, prior to the end of the initial ninety (90) day compliance schedule, with full justification of the reasons for the inability to meet this date.

The notification which shall be submitted by the Permittee does require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

C.9 Maintenance of Monitoring Equipment [326 IAC 2-7-5(3)(A)(iii)]

(a) In the event that a breakdown of the monitoring equipment occurs, a record shall be made of the times and reasons of the breakdown and efforts made to correct the problem. To the extent practicable, supplemental or intermittent monitoring of the parameter should be implemented at intervals no less frequent than required in Section D of this approval until such time as the monitoring equipment is back in operation. In the case of continuous monitoring, supplemental or intermittent monitoring of the parameter should be implemented at intervals no less than one (1) hour (this time frame is determined on a case by case basis until such time as the continuous monitor is back in operation.

(b) The Permittee shall install, calibrate, quality assure, maintain, and operate all necessary monitors and related equipment. In addition, prompt corrective action shall be initiated whenever indicated.

C.10 Actions Related to Noncompliance Demonstrated by a Stack Test [326 IAC 2-7-5] [326 IAC 2-7-6]

(a) When the results of a stack test performed in conformance with Section C - Performance Testing, of this approval exceed the level specified in any condition of this approval, the Permittee shall take appropriate corrective actions. The Permittee shall submit a description of these corrective actions to IDEM, OAM, within thirty (30) days of receipt of the test results. The Permittee shall take appropriate action to minimize emissions from the affected facility while the corrective actions are being implemented. IDEM, OAM shall notify the Permittee within thirty (30) days, if the corrective actions taken are deficient. The Permittee shall submit a description of additional corrective

actions taken to IDEM, OAM within thirty (30) days of receipt of the notice of deficiency. IDEM, OAM reserves the authority to use enforcement activities to resolve noncompliant stack tests.

(b) A retest to demonstrate compliance shall be performed within one hundred twenty (120) days of receipt of the original test results. Should the Permittee demonstrate to IDEM, OAM that retesting in one-hundred and twenty (120) days is not practicable, IDEM, OAM may extend the retesting deadline. Failure of the second test to demonstrate compliance with the appropriate approval conditions may be grounds for immediate revocation of the approval to operate the affected facility.

The documents submitted pursuant to this condition do not require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

C.11 Monitoring Data Availability [326 IAC 2-7-6(1)] [326 IAC 2-7-5(3)]

(a) With the exception of performance tests conducted in accordance with Section C-Performance Testing, all observations, sampling, maintenance procedures, and record keeping, required as a condition of this approval shall be performed at all times the equipment is operating at normal representative conditions.

(b) As an alternative to the observations, sampling, maintenance procedures, and record keeping of subsection (a) above, when the equipment listed in Section D of this approval is not operating, the Permittee shall either record the fact that the equipment is shut down or perform the observations, sampling, maintenance procedures, and record keeping that would otherwise be required by this approval.

(c) If the equipment is operating but abnormal conditions prevail, additional observations and sampling should be taken with a record made of the nature of the abnormality.

(d) If for reasons beyond its control, the operator fails to make required observations, sampling, maintenance procedures, or record keeping, reasons for this must be recorded.

(e) At its discretion, IDEM may excuse such failure providing adequate justification is documented and such failures do not exceed five percent (5%) of the operating time in any quarter.

(f) Temporary, unscheduled unavailability of staff qualified to perform the required observations, sampling, maintenance procedures, or record keeping shall be considered a valid reason for failure to perform the requirements stated in (a) above.

C.12 General Record Keeping Requirements [326 IAC 2-7-5(3)][326 IAC 2-7-6]

(a) Records of all required monitoring data and support information shall be retained for a period of at least five (5) years from the date of monitoring sample, measurement, report, or application. These records shall be kept at the source location for a minimum of three (3) years and available upon the request of an IDEM, OAM, representative. The records may be stored elsewhere for the remaining two (2) years as long as they are available upon request. If the Commissioner makes a written request for records to the Permittee, the Permittee shall furnish the records to the Commissioner within a reasonable time.

(b) Records of required monitoring information shall include, where applicable:

(1) The date, place, and time of sampling or measurements;

(2) The dates analyses were performed;

(3) The company or entity performing the analyses;

(4) The analytic techniques or methods used;

(5) The results of such analyses; and

(6) The operating conditions existing at the time of sampling or measurement.

(c) Support information shall include, where applicable:

(1) Copies of all reports required by this approval;

(2) All original strip chart recordings for continuous monitoring instrumentation;

(3) All calibration and maintenance records;

(4) Records of preventive maintenance shall be sufficient to demonstrate that improper maintenance did not cause or contribute to a violation of any limitation on emissions or potential to emit. To be relied upon subsequent to any such violation, these records may include, but are not limited to: work orders, parts inventories, and operator's standard operating procedures. All records shall briefly describe what maintenance and response steps were taken and indicate who performed the tasks.

(d) All record keeping requirements not already legally required shall be implemented within ninety (90) days of approval issuance.

C.13 General Reporting Requirements [326 IAC 2-7-5(3)(C)]

(a) The reports required by conditions in Section D of this approval shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

(b) Unless otherwise specified in this approval, any notice, report, or other submission required by this approval shall be considered timely if the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAM, on or before the date it is due.

(c) Unless otherwise specified in this approval, any quarterly report shall be submitted within thirty (30) days of the end of the reporting period. The report does not require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

(d) The first report shall cover the period commencing on the date of issuance of this approval and ending on the last day of the reporting period.

SECTION D.1 FACILITY OPERATION CONDITIONS

The installation of new process tanks, identified as Gen'l Tank 33-1, with a capacity of 2,000 gallons, for a like-kind replacement of the old process tank; Gen'l Tank 43-1 with a capacity of 1,000 gallons, to replace a 750 gallon process tank; and a portable process Gen'l Tank PT-3 with a capacity of 100 gallons. The volatile organic compounds (VOC) emissions from these tanks will be controlled by the existing Regenerative Thermal Oxidizer (RTO) permitted under Construction Permit CP157-1980 or the condensers.

The point source emissions from the process vessels may vent directly to the RTO, or they may first vent to scrubbers, process control condensers, vacuum sources, or through other process vessels before going to the RTO. If venting the process vessel to the RTO would cause a safety concern, the process vessels may vent to an alternative pollution control device. Also, in the event that the RTO is unavailable, Lilly would continue manufacturing operations in the process vessels using other existing pollution control equipment that complies with 326 IAC 8-5-3. The carbon monoxide emissions from these replacement tanks will be voluntarily controlled by the RTOs. The sulfur dioxide emissions from these replacement tanks will be voluntarily controlled by scrubbers. The nitrogen oxides emissions from these replacement tanks will be voluntarily controlled by scrubbers.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emissions Limitation and Standards

D.1.1 Sulfur Dioxide

(a) The amount of sulfur containing compound (SCC) from the process forming SO2 from process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3 before the control system shall be limited to less than 780 pound-mole (lb-mole) equivalent per twelve-month period, rolled on a monthly basis, in order to assure compliance with the SO2 emissions limit of less than 25 tons per twelve month period (where one lb-mole equivalent of SCC is the amount of SCC that reacts to form one lb-mole of SO2).

(b) During the first 12 months of operation of process tanks, Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of sulfur containing compound (SCC) from the process forming SO2 from tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3 before the control system shall be limited, such that the total amount of SCC divided by months of operation shall be less than 65 lb-mole equivalent per month.

(c) Compliance with (a) and (b) of this condition will make 326 IAC 2-7-10.5(f), Significant Source Modification, 326 IAC 2-2 and 40 CFR 52.21 the Prevention of Significant Deterioration (PSD), not applicable.

D.1.2 Hazardous Air Pollutants

(a) The amount of raw materials used from process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3 shall be limited, such that the single HAP emissions before the control system shall be less than 10 tons per twelve-month period, rolled on a monthly basis.

During the first 12 months of operation of process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of the raw materials used before the control system shall be limited, such that this limit divided by months of operation shall result in single HAP emissions less than 0.833 ton per month.

(b) The amount of raw materials used from process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3 shall be limited, such that the combined HAPs emissions before the control system shall be less than 25 tons per twelve-month period, rolled on a monthly basis.

During the first 12 months of operation of process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of the raw materials used before the control system shall be limited, such that this limit divided by months of operation shall result in combined HAPs emissions less than 2.08 ton per month.

(c) Compliance with (a) and (b) of this condition will make 326 IAC 2-7-10.5(f), Significant Source Modification not applicable.

D.1.3 Miscellaneous Operation: Synthesized Pharmaceutical Manufacturing (326 IAC 8-5-3)

Pursuant to 326 IAC 8-5-3 the following outlet gas temperature when using condensers to control the VOC emissions from these process tanks including the existing facilities at the plant shall not exceed the following:

(a) minus twenty-five degrees Celsius (-25 ^{0}C) when condensing VOC of vapor pressure greater than forty (40) kilo Pascals (five and eight-tenths (5.8) pounds per square inch);

(b) minus fifteen degrees Celsius (-15 ^{0}C) when condensing VOC of vapor pressure greater than twenty (20) kilo Pascals (two and nine-tenths (2.9) pounds per square inch);

(c) zero degrees Celsius (0 ^{0}C) when condensing VOC of vapor pressure greater than ten (10) kilo Pascals (one and five-tenths (1.5) pounds per square inch);

(d) ten degrees Celsius (10 ^{0}C) when condensing VOC of vapor pressure greater than seven (7) kilo Pascals (one (1) pounds per square inch);

(e) twenty -five degrees Celsius (25 ^{0}C) when condensing VOC of vapor pressure greater than three and five-tenths (3.5) kilo Pascals (five-tenths (0.5) pounds per square inch);

Testing Requirements

D.1.4 Testing Requirements [326 IAC 2-7-6(1),(6)][326 IAC 2-1.1-11]

The Permittee is not required to test the facilities by this permit. The testing required for these facilities will be deferred and shall follow the schedule in the Title V Permit, to determine compliance with 326 IAC 8-5-3. However, IDEM may require compliance testing when necessary to determine if the facilities are in compliance. If testing is required by IDEM compliance with Condition D.1.3 shall be determined by a performance test conducted in accordance with Section C - Performance Testing.

D.1.5 Volatile Organic Compounds 326 IAC 8-5-3(b)(5)(6)

(a) Pursuant to 326 IAC 8-5-3(b)(5) the Permittee shall install covers on all in process tanks that contain VOC's. These covers shall be kept closed unless production sampling, maintenance, or inspection procedures require operator access.

(b) Pursuant to 326 IAC 8-5-3(b)(6) the Permittee shall repair all visible leaks containing VOC. The repair shall be completed the first time the equipment is off line for a period of time long enough to complete the repair.

Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

D.1.6 Monitoring For VOC Emissions

(a) The VOC emissions from the proposed process vessels Gen'l Tank 33-1, Gen'l Tank 43-1 and Gen'l Tank PT-3 shall be in compliance with 326 IAC 8-5-3 provided that:

(1) the Regenerative Thermal Oxidizers (RTO) or Condensers (when Lilly elects to control the VOC by condensers) shall operate at all times the equipment being controlled are in operation;

(2) when the VOC emissions from the proposed process tanks including the existing facilities are controlled by the RTO, the RTO's operating temperature shall be maintained at 1600^0F, or the temperature determined during the most recent stack tests, to maintain at least 90% destruction of the volatile organic compounds. The operating temperature of the RTO shall be recorded and monitored continuously;

(3) when the VOC emissions from the proposed process tanks including the existing facilities are controlled by the condensers, the outlet gas temperature shall be equal to or less than that specified by 326 IAC 8-5-3, see condition D.1.3;

(4) the Permittee records the time during which the RTO or condensers, serving the proposed process tanks, including the existing facilities, were not operated;

(5) the Permittee records the reason the RTO or condensers were not operated;

(6) the Permittee records the corrective actions taken to bring the RTO or condensers to normal operation; and

(7) the Permittee records the number of hours the proposed process tanks, including the existing facilities were vented to points other than the RTO or a condenser complying with 326 IAC 8-5-3.

D.1.7 National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR Part 63, Subparts I and H

That the owner or operator shall implement the Lilly Leak Detection and Repair (LDAR) Program, most recently approved by the Office of Air Management, to reduce fugitive VOC emissions from processes that use methylene chloride. If it is not feasible to either pressure test a group of fugitive sources or monitor a specific compound, then a written justification will be required for each source or compound exempted from testing. Any necessary adjustments to the procedures shall be submitted to the Office of Air Management for approval prior to implementation.

D.1.8 National Emission Standards for Hazardous Air Pollutants for Pharmaceutical Production (NESHAPs) 40 CFR Part 63, Subpart GGG

The new process tanks, identified as Gen'l Tank 33-1, Gen'l Tank 43-1 and portable Gen'l Tank PT-3, are subject to 40 CFR Part 63, Subpart GGG - National Emission Standards for Hazardous Air Pollutants for Pharmaceutical Production, and shall be in compliance with this NESHAP by the compliance date of September 21, 2001.

D1.9 Malfunction Condition

Pursuant to 326 IAC 1-6-2 (Records; Notice of Malfunction):

(a) A record of all malfunctions, including startups or shutdowns of any facility or emission control equipment, which result in violations of applicable air pollution control regulations or applicable emission limitations shall be kept and retained for a period of three (3) years and shall be made available to the Indiana Department of Environmental Management (IDEM), Office of Air Management (OAM) or appointed representative upon request.

(b) When a malfunction of any facility or emission control equipment occurs which lasts more than one (1) hour, said condition shall be reported to OAM. The Permittee is encouraged, but not required, to use the Malfunction Report Form (2 pages) attached to this permit. Notification shall be made by telephone or facsimile, as soon as practicable, but in no event later than four (4) daytime business hours after the beginning of said occurrence.

(c) Failure to report a malfunction of any emission control equipment subject to the requirements of 326 IAC 1-6 shall constitute a violation of 326 IAC 1-6 and any other applicable rules. Information of the scope and expected duration of the malfunction shall be provided, including the items specified in 326 IAC 1-6-2(a)(1) through (6).

(d) Malfunction is defined as any sudden, unavoidable failure of any air pollution control equipment, process, or combustion or process equipment to operate in a normal and usual manner.

Record Keeping and Reporting Requirements

D.1.10 Record Keeping Requirements

(a) The Permittee shall maintain records in accordance with (1) through (5) as follows:

(1) The malfunction report of the RTOs; and other malfunction reports of the facilities when the RTO is operating but the facilities are not venting to the RTO;

(2) The RTO's operating temperature;

(3) The number of hours the proposed process tanks including existing facilities were vented to points other than the RTO or the condenser;

(4) The amount of sulfur containing compound (SCC) usages from process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3; and

(5) The HAP usages from process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3;

(b) All records shall be maintained in accordance with Section C - General Record Keeping Requirements, of this permit.

D.1.11 Reporting Requirements

A quarterly summary of the information to document compliance with Conditions D.1.1 and D.1.3 shall be submitted to the address listed in Section C - General Reporting Requirements, of this permit, using the reporting forms located at the end of this permit, or their equivalent, within thirty (30) days after the end of the quarter being reported.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION

FAX NUMBER - 317 233-5967

This form should only be used to report malfunctions applicable to Rule 326 IAC 1-6 and to qualify for the exemption under 326 IAC 1-6-4.

THIS FACILITY MEETS THE APPLICABILITY REQUIREMENTS BECAUSE: IT HAS POTENTIAL TO EMIT 25 LBS/HR PARTICULATES ?_____, 100 LBS/HR VOC ?_____, 100 LBS/HR SULFUR DIOXIDE ?_____ OR 2000 LBS/HR OF ANY OTHER POLLUTANT ?_____ EMISSIONS FROM MALFUNCTIONING CONTROL EQUIPMENT OR PROCESS EQUIPMENT CAUSED EMISSIONS IN EXCESS OF APPLICABLE LIMITATION _____.

THIS MALFUNCTION RESULTED IN A VIOLATION OF: 326 IAC _____ OR, PERMIT CONDITION # _____ AND/OR PERMIT LIMIT OF _____

THIS INCIDENT MEETS THE DEFINITION OF 'MALFUNCTION' AS LISTED ON REVERSE SIDE ? Y N

THIS MALFUNCTION IS OR WILL BE LONGER THAN THE ONE (1) HOUR REPORTING REQUIREMENT ? Y N

COMPANY: Eli Lilly and Company PHONE NO. (765) 477-4867

LOCATION: (CITY AND COUNTY) Shadeland, Indiana
PERMIT NO. 157-11183 AFS PLANT ID: 157-00006 AFS POINT ID: _____ INSP: _____
CONTROL/PROCESS DEVICE WHICH MALFUNCTIONED AND REASON:
_____
_____
_

DATE/TIME MALFUNCTION STARTED: _____/_____/ 19____ _____ AM / PM

ESTIMATED HOURS OF OPERATION WITH MALFUNCTION CONDITION:
_____

DATE/TIME CONTROL EQUIPMENT BACK-IN SERVICE_____/_____/ 19____ _____ AM/PM

TYPE OF POLLUTANTS EMITTED: TSP, PM-10, SO2, VOC, OTHER: _____

ESTIMATED AMOUNT OF POLLUTANT EMITTED DURING MALFUNCTION:
_____
_____

MEASURES TAKEN TO MINIMIZE EMISSIONS:
_____
_____

REASONS WHY FACILITY CANNOT BE SHUTDOWN DURING REPAIRS:

CONTINUED OPERATION REQUIRED TO PROVIDE ESSENTIAL* SERVICES:
_____
CONTINUED OPERATION NECESSARY TO PREVENT INJURY TO PERSONS:_____
CONTINUED OPERATION NECESSARY TO PREVENT SEVERE DAMAGE TO EQUIPMENT:_____
INTERIM CONTROL MEASURES: (IF APPLICABLE)
_____
_____

MALFUNCTION REPORTED BY: _____TITLE:_____
(SIGNATURE IF FAXED)
MALFUNCTION RECORDED BY: _____DATE:_____TIME:_____

Please note - This form should only be used to report malfunctions applicable to Rule 326 IAC 1-6 and to qualify for the exemption under 326 IAC 1-6-4.

326 IAC 1-6-1 Applicability of rule

Sec. 1. The requirements of this rule (326 IAC 1-6) shall apply to the owner or operator of any facility which has the potential to emit twenty-five (25) pounds per hour of particulates, one hundred (100) pounds per hour of volatile organic compounds or SO2, or two thousand (2,000) pounds per hour of any other pollutant; or to the owner or operator of any facility with emission control equipment which suffers a malfunction that causes emissions in excess of the applicable limitation.

326 IAC 1-2-39 "Malfunction" definition

Sec. 39. Any sudden, unavoidable failure of any air pollution control equipment, process, or combustion or process equipment to operate in a normal and usual manner. (Air Pollution Control Board; 326 IAC 1-2-39; filed Mar 10, 1988, 1:20 p.m. : 11 IR 2373)

***Essential services** are interpreted to mean those operations, such as, the providing of electricity by power plants. Continued operation solely for the economic benefit of the owner or operator shall not be sufficient reason why a facility cannot be shutdown during a control equipment shutdown.

If this item is checked on the front, please explain rationale:

_____

_____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION

Minor Source Modification Quarterly Report

Source Name: Eli Lilly & Company, Tippecanoe Laboratories
Source Address: 1650 Lilly Road, Shadeland, Indiana 47905
Mailing Address: P. O. Box 685, Lafayette, Indiana 47902-0685
Minor Source Modification No.: 157-11183-00006
Facility: Gen'l Tank 43-1 & Portable Gen'l Tank PT-3
Parameter: SO2
Limit: Sulfur containing compound (SCC): <780 lb-mole equivalent per 12- month period, rolled on a monthly basis, in order to assure compliance with the SO2 emissions limit of less than 25 tons per twelve month period

During the first 12 months of operation of process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of sulfur containing compound (SCC) from the process forming SO2 from tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3 before the control system shall be limited, such that the total amount of SCC divided by months of operation shall be less than 65 lb-mole per month.

YEAR: _____

Month	Column 1		Column 2		Column 1 + Column 2	
	SCC Used This Month (lb-mole equivalent)	Equivalent SO2 Emissions This Month (tons)	SCC Used Previous 11 Months (lb-mole equivalent)	Equivalent SO2 Emissions Previous 11 Months (tons)	SCC Used 12 Month Total (lb-mole equivalent)	Equivalent SO2 Emissions 12 Month Total (tons)
Month 1						
Month 2						
Month 3						

Submitted by: _____
Title / Position: _____
Signature: _____
Date: _____
Phone: _____

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION

Minor Source Modification Quarterly Report

Source Name: Eli Lilly & Company, Tippecanoe Laboratories
Source Address: 1650 Lilly Road, Shadeland, Indiana 47905
Mailing Address: P. O. Box 685, Lafayette, Indiana 47902-0685
Minor Source Modification No.: 157-11183-00006
Facility: Gen'l Tank 43-1 & Portable Gen'l Tank PT-3
Parameter: Single HAP & Combined HAPs
Limit: Single HAP - < 10 tons per 12 month period, rolled on a monthly basis.

During the first 12 months of operation of process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of the raw materials used before the control system shall be limited, such that this limit divided by months of operation shall result in single HAP emissions less than 0.833 ton per month.

Combined HAPs - < 25 tons 12 month period, rolled on a monthly basis.
During the first 12 months of operation of process tanks Gen'l Tank 43-1 and portable Gen'l Tank PT-3, the amount of the raw materials used before the control system shall be limited, such that this limit divided by months of operation shall result in combined HAPs emissions less than 2.08 ton per month.

YEAR: _____

Month	Column 1				Column 2				Column 1 + Column 2			
	Single HAP Used This Month (tons)	Equivalent Single HAP Emissions This Month (tons)	Combined HAPs Used This Month (tons)	Equivalent Combined HAPs Emissions This Month (tons)	Single HAP Used Previous 11 Months (tons)	Equivalent Single HAP Emissions Previous 11 Months (tons)	Combined HAPs Used This Month (tons)	Equivalent Combined HAPs Emissions This Month (tons)	Single HAP Used 12 Month Total (tons)	Equivalent Single HAP Emissions 12 Month Total (tons)	Combined HAPs Used This Month (tons)	Equivalent Combined HAPs Emissions This Month (tons)
Month 1												
Month 2												
Month 3												

Submitted by: _____
Title / Position: _____
Signature: _____
Date: _____
Phone: _____

Indiana Department of Environmental Management
Office of Air Management

Technical Support Document (TSD) for a Minor Source Modification Permit

Source Background and Description

Source Name:	Eli Lilly and Company, Tippecanoe Laboratories
Source Location:	1650 Lilly Road, Shadeland, Indiana 47905
County:	Tippecanoe
SIC Code:	2834 & 2879
Operation Permit No.:	TV157-6879-00006
Operation Permit Issuance Date:	Pending
Minor Source Modification No.:	157-11183-00006
Permit Reviewer:	Aida De Guzman

The Office of Air Management (OAM) has reviewed a modification application from Eli Lilly and Company relating to the installation of new process tanks, identified as Gen'l Tank 33-1, with a capacity of 2,000 gallons, for a like-kind replacement of the old process tank; Gen'l Tank 43-1 with a capacity of 1,000 gallons, to replace a 750 gallon process tank; and a portable process Gen'l Tank PT-3 with a capacity of 100 gallons. The volatile organic compounds (VOC) emissions from these tanks will be controlled directly by the existing Regenerative Thermal Oxidizer (RTO) permitted under Construction Permit CP157-1980).

These process vessels are used in a variety of operations involved in pharmaceutical manufacturing . These operations are mainly batch in nature and include but are not limited to: heating, cooling, distilling (atmospheric and vacuum), extracting, crystallizing, chemical synthesis, cryogenic service and associated operations.

The point source emissions from these process vessels may vent directly to the RTO, or they may first vent to scrubbers, process control condensers, vacuum sources, or through other process vessels before going to the RTO. If venting the process vessel to the RTO would cause a safety concern, the process vessels may vent to an alternative pollution control device. Also, in the event that the RTO is unavailable, Lilly would continue manufacturing operations in the process vessels using other existing pollution control equipment that complies with 326 IAC 8-5-3. The carbon monoxide emissions from these replacement tanks will be voluntarily controlled by the RTOs. The sulfur dioxide emissions from these replacement tanks will be voluntarily controlled by scrubbers. The nitrogen oxides emissions from these replacement tanks will be voluntarily controlled by scrubbers.

History

The source has submitted a Title V permit (TV 157-6879-00006) on October 10, 1996, and it is still pending for issuance.

Recommendation

The staff recommends to the Commissioner that the Minor Source Modification be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

An application for the purposes of this review was received on July 29, 1999. Additional information was received via e-mail on August 31, 1999; September 7, and 9, 1999; and October 5, 1999.

Emission Calculations

See attached 20 pages detailed Emission Calculations.

Proposed Process Tanks	Capacity (Gallons)	Existing Process Tanks	Capacity (gallons)	Control Devices
Gen'l Tank 33-1	2,000	Gen'l Tank 33-1	2,000	RTO, Scrubber, Condensers
Gen'l Tank 43-1	1,000	Gen'l Tank 43-1	750	RTO, Scrubber, Condensers
Portable Gen'l Tank PT-3	100	-	-	RTO, Scrubber, Condensers

Uncontrolled/Unlimited PTE

Uncontrolled PTE (tons/year)								
Proposed Process Tanks	Capacity (Gallons)	VOC	CO	SO2	NOx	Inorganic HAP	Organic HAP	Total HAPs
Gen'l Tank 33-1	2,000	38.03	39.55	60.6	3.39	48.0	38.03	86.03
Gen'l Tank 43-1	1,000	19.53	19.77	30.3	1.7	12.0	19.53	31.53
Portable Gen'l Tank PT-3	100	2.86	1.98	3.03	0.17	1.2	2.86	4.06
TOTAL		60.42	61.30	93.93	5.26	61.2	60.42	121.62

The above emissions for VOC point sources from process vessels were determined using the equation found in the EPA Guideline for Control of VOC from Manufacture of Synthesized Pharmaceutical Products, EPA-450/2-78-029. The process vessel VOC emission estimates are based on a combination of the typical unit operations that are done to perform a process. The steps in the process includes charging, heating, tank evacuation with vacuum distillations, atmospheric distillations, centrifuging and drying.

These emissions are based on the worst case any one process tank can emit by itself, but because it is difficult to quantify emissions that can be attributed to each individual tank, the entire building emission is assumed to come from each tank by itself.

Potential To Emit before Control

Pursuant to 326 IAC 2-1.1-1(16), Potential to Emit is defined as "the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or type or amount of material combusted, stored, or processed shall be treated as part of its design if the limitation is enforceable by the U. S. EPA."

Pollutant	Potential To Emit (tons/year)
PM	0.0
PM-10	0.0
SO_2	93.93
VOC	60.42
CO	61.30
NO_x	5.26
HAPs Combined	121.62

Note: For the purpose of determining Title V applicability for particulates, PM-10, not PM, is the regulated pollutant in consideration.

Justification for the Permit Level

Gen'l Tank 33-1 will have an uncontrolled PTE regulated pollutants that exceeds the emission thresholds in 326 IAC 2-7-10.5(f) which subject a process to the significant source modification. However, since the tanks will replace or repair a part or piece of equipment in an existing process, this new process tank Gen'l Tank 33-1 qualifies for Minor Source Modification under 326 IAC 2-7-10.5(d)(8).

Gen'l Tank 43-1 will have an uncontrolled PTE VOC of 19.53 tons/year; NOx of 1.70 tons/year; CO of 19.77 tons/year; SO2 of 30.30 tons/yr; and total inorganic HAP emissions of 12 tons/year.

Portable process Gen'l Tank PT-3, has an uncontrolled VOC PTE of 2.86 tons/year, NOx of 0.17 tons/year; CO of 1.98 tons/year; SO2 of 3.03 tons/year and total inorganic HAP emissions of 1.2 tons/year.

The like-kind replacement tank (Gen'l Tank 33-1) qualifies under a Minor Source Modification, however, since the other two (2) process tanks are not like-kind replacement, and have a total PTE exceeding the thresholds in 326 IAC 2-7-10.5(f), they are subject to **Significant Source Modification**. The source however, requested a limit on SO2 emissions coming from Tanks 43-1 and PT-3 to less than 25 tons per year, a limit on combined HAPs emissions coming from Tank 43-1 and PT-3 to less than 25 tons per year, and a limit on single HAP emissions from Tanks 43-1 and PT-3 to less than 10 tons per year, in order to be subject to a **326 IAC 2-7-10.5(d)(5), Minor Source Modification.**

Actual Emissions

No previous emission data has been received from the source.

Limited/Controlled Potential to Emit

The table below summarizes the total potential to emit, reflecting all limits from the modification:

	Limited/Controlled Potential to Emit (tons/year)							
Process/facility	**PM**	**PM-10**	**SO_2**	**VOC**	**CO**	**NO_x**	**Single HAP**	**Combined HAPs**
Process Tank Gen'l Tank 33-1	0.0	0.0	60.60	3.9	39.55	3.39	48.0	51.90
Process Tanks Gen'l Tanks 43-1; & PT-3	0.0	0.0	<25	2.33	21.75	1.87	<10	<25
Total Emissions	0.0	0.0	<85.6	6.23	61.30	5.26	<58	<76.9

(a) Process tank Gen'l Tank 33-1 is a like-kind replacement of the old process tank, and is not subject to 326 IAC 2-2. The tank replacement qualify as a routine repair and replacement under the PSD rules (40 CFR 52.21) and 326 IAC 2-2, and is exempt from the PSD permitting requirements.

(b) Process tanks Gen'l Tank 43-1, and PT-3 are not subject to 326 IAC 2-2, because no criteria pollutant is emitted by these tanks at a significant level of 40 tons per year, and CO is not emitted at a rate of 100 tons per year (see table, PTE After Controls on page 3 of 7 of this TSD).

(Combined HAPs for Tank 33-1 = 48.0 Inorganic HAPs + 3.90 Organic HAP after 326 IAC 8-5-3 control).

CO is voluntarily controlled by the RTO with a control efficiency of 95%.

Uncontrolled SO2 emissions from Gen'l Tanks 43-1 and PT-3 are limited to less than 25 tons per year, in order to be subject to a Minor Source Modification, instead of the Significant Source Modification. In addition to this limitation, the SO2 emission is voluntarily controlled by the scrubbers with a control efficiency of 95%.

Gen'l Tank 33-1: SO2 is voluntarily controlled by scrubbers with a control efficiency of 95%.

Gen'l Tank 43-1 & PT-3
SO2 uncontrolled PTE = (Gen'l Tank 43-1, 30.30) + (PT-3, 3.03)
= 33.33 tons/year
Limited PTE = < 25 tons/yr to qualify for Minor Modification

County Attainment Status

The source is located in Tippecanoe County.

Pollutant	Status (attainment, maintenance attainment, or unclassifiable; severe, moderate, or marginal nonattainment)
PM-10	attainment
SO_2	attainment
NO_2	attainment
Ozone	attainment
CO	attainment
Lead	attainment

(a) Volatile organic compounds (VOC) and oxides of nitrogen (NOx) are precursors for the formation of ozone. Therefore, VOC and NO_X emissions are considered when evaluating the rule applicability relating to the ozone standards. Tippecanoe County has been designated as attainment or unclassifiable for ozone.

Federal Rule Applicability

(a) New Source Performance Standards (NSPS)

(1) 40 CFR Part 60, Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for which construction, reconstruction, or modification commenced after July 23, 1994.

This NSPS is not applicable to the new tanks, because they are process tanks and not storage tanks.

(2) 40 CFR § 60.610, Subpart III - Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes.

This NSPS applies to each air oxidation reactor unit for which Construction, Modification or Reconstruction commenced after October 21, 1983 that produces any chemical or compounds listed in this NSPS as a product, co-product, by-product or intermediate product.

The process tanks' operation is not subject to this NSPS because this operation does not involve any chemical or compounds production listed in this NSPS as a product, co-product, by-product or intermediate product.

(3) 40 CFR § 60.660, Subpart NNN - Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.

This NSPS applies to each distillation unit for which Construction, Modification or Reconstruction commenced after December 30, 1983 that produces any chemical or compounds listed in this NSPS as a product, co-product, by-product or intermediate product.

The process tanks' operation is not subject to this NSPS because this operation does not involve any chemical or compounds production listed in this NSPS as a product, co-product, by-product or intermediate product.

(4) 40 CFR § 60.700, Subpart RRR - Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

This NSPS applies to each reactor process for which Construction, Modification or Reconstruction commenced after June 29, 1990 that produces any chemical or compounds listed in this NSPS as a product, co-product, by-product or intermediate product.

The process tanks' operation is not subject to this NSPS, because this operation does not involve any chemical nor compounds production listed in this NSPS as a product, co-product, by-product or intermediate product.

(5) There are no other New Source Performance Standards (NSPS)(326 IAC 12 and 40 CFR Part 60) applicable to this source.

(b) National Emission Standards for Hazardous Air Pollutants (NESHAPs)

(1) 40 CFR Part 63, Subparts I and H - National Emission Standards for Organic Hazardous Air Pollutants for Certain Processes Subject to the Negotiated Regulation for Equipment Leaks; and 40 CFR Part 63, Subpart H - National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks.

This NESHAP applies to the proposed process vessels when Methylene Chloride is used in them, pursuant to Section (b)(5) of this NESHAP (Pharmaceutical Production Processes) using Methylene Chloride or Carbon Tetrachloride).

Lilly will comply with these requirements with the implementation of Lilly's Leak Detection and Repair Program (LDAR) when Methylene Chloride is used in them.

(2) 40 CFR Part 63, Subpart B - Requirements for Control Technology Determinations for Major Sources in Accordance with the Clean Air Act Amendments of 1990, Sections 112(g)(2)(B).

The requirements of Part 63.40 through Part 63.44 of this Subpart apply to any owner, or operator who construct or reconstruct a major source of HAPs after the effective date of section 112(g)(2)(B) and the effective date of a Title V permit Program in the State or local jurisdiction in which the major source in question has been specifically regulated or exempted from regulation under a standard issued pursuant to sections 112(d), 112(h) or 112(j) and incorporated in another subpart of part 63.

This NESHAP is not applicable to these process tanks for the following reasons:

(a) This project does not constitute construction, reconstruction of a process or production unit because (1) the fabrication, erection or installation covered by this application does not constitute a collection of all the equipment necessary to the production of an intermediate or final product; and (2) the fixed capital cost of this project does not exceed 50% of the fixed capital cost for the replacement of any of the affected process or production unit.

(b) The proposed replacement process tank, Gen'l Tank 33-1; and Gen'l Tank 43-1, and portable Gen'l Tank PT-3 are regulated under 40 CFR Part 63, Subpart GGG - National Emission Standards for Hazardous Air Pollutants for Pharmaceutical Production, which was promulgated on September 21, 1998.

These process tanks shall be in compliance with this NESHAP by the compliance date of September 21, 2001.

State Rule Applicability - Entire Source

(a) 326 IAC 2-2 (Prevention of Significant Deterioration)

(1) Process tank Gen'l Tank 33-1 is a like-kind replacement of the old process tank, and is not subject to 326 IAC 2-2. The tank replacement qualifies as a routine repair and replacement under the PSD rules (40 CFR 52.21) and 326 IAC 2-2, and is exempt from the PSD permitting requirements.

(2) Process tanks Gen'l Tank 43-1, and PT-3 are not subject to 326 IAC 2-2, because no criteria pollutant is emitted by these tanks at a significant level of 40 tons per year, and CO is not emitted at a rate of 100 tons per year (see table, PTE After Controls on page 3 of 7 of this TSD).

(b) 326 IAC 2-6 (Emission Reporting)
This source is subject to 326 IAC 2-6 (Emission Reporting), because it is a Title V source, which has the potential to emit more than one hundred (100) tons per year) of at least one of the criteria pollutants. Pursuant to this rule, the owner/operator of the source must annually submit an emission statement for the source. The annual statement must be received by July 1 of each year and contain the minimum requirement as specified in 326 IAC 2-6-4. The submittal should cover the period defined in 326 IAC 2-6-2(8)(Emission Statement Operating Year).

(c) 326 IAC 5-1 (Visible Emissions Limitations)
Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this permit:

(d) Opacity shall not exceed an average of forty percent (40%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.

(e) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

State Rule Applicability - Individual Facilities

(a) 326 IAC 8-5-3 (Miscellaneous Operation: Synthesized Pharmaceutical Manufacturing Operations)

(1) This rule applies to the manufacture of pharmaceutical products by chemical synthesis. This section applies to all facilities including the **proposed Gen'l Tank 33-1, Gen'l Tank 43-1 and portable Gen'l Tank PT-3** emitting volatile organic compounds, and also including reactors, distillation units, dryers, storage of organic compounds , transfer of organic compounds, extraction equipment , filters, crystallizers, and centrifuges that have the potential to emit 15 pounds per day or more. The sections that are applicable to Lilly are (b)(1), (5) and (6).

Section (b)(1) of this rule requires that the VOC emissions coming from all reactors, distillation operation, crystallizers, centrifuges, and vacuum dryers shall be controlled by condensers or equivalent controls. The approximate control efficiency required by 326 IAC 8-5-3(b)(1) when using acetone, which has the worst volatility is around 90%.

Lilly is in compliance with this section of the rule, controlling the VOC emissions using either condensers in series with the Regenerative Thermal Oxidizer (RTO), or using the RTO alone. Lilly typically uses the existing RTO to control point source VOC emission from the tanks. The RTO, which has been demonstrated to achieve VOC removal efficiency in excess of 97%, will meet and exceed the requirement of the rule. If the RTO cannot be used due to safety issues, an alterative control device may be used. An analysis to demonstrate the alternative controls are equivalent controls will be done before they are used. Lilly would like to continue manufacturing operations in the process vessels included in this application using other existing pollution control equipment that complies with 326 IAC 8-5-3.

Section(b)(5) of this rule requires the owner or operator to install covers on all in process tanks that contain VOC's. Lilly complies with this section by using covers on all in process tanks, these covers are closed unless production sampling, maintenance, or inspection procedures require operator access.

Section (b)(6) of this rule requires the owner or operator to repair all visible leaks containing VOC. The repair shall be completed the first time the equipment is off line for a period of time long enough to complete the repair.

(b) 326 IAC 8 (Volatile Organic Sources)
There are no other rule in Article 8 that would apply to the proposed process tanks.

(c) 326 IAC 7 (Sulfur Dioxide Emission Limitation)
All facilities with a potential to emit 25 tons per year or 10 tons per hour of sulfur dioxide shall comply with the limitation under this rule.

The sulfur dioxide emissions from the process tanks are not subject to the emissions limitation under this rule, because the limitation are specifically for combustion facilities.

(d) 326 IAC 2-4.1-1 (Toxics Control Rule)
The proposed process tanks are not subject to this rule because of the following reasons:

(1) The proposed process tanks are regulated under 40 CFR Part 63, Subpart GGG - National Emission Standards for Hazardous Air Pollutants for Pharmaceutical Production, which was promulgated on September 21, 1998. They will be subject to the existing source MACT requirement of that rule.

(2) This project does not constitute construction, reconstruction of a process or production unit because (1) the fabrication, erection or installation covered by this application does not constitute a collection of all the equipment necessary to the production of an intermediate or final product; and (2) the fixed capital cost of this project does not exceed 50% of the fixed capital cost for the replacement of any of the affected process or production unit.

(e) There are no previous permit conditions for the replaced process tanks, identified Gen'l Tank 43-1 and PT-3 that will be carried over in this source minor modification, including emissions limit to avoid PSD.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants (HAPs) set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Part 70 Application Form GSD-08.

(a) This source will emit levels of air toxics less than those which constitute a major source according to Section 112 of the 1990 Clean Air Act Amendments.

Since it is difficult to predict the mix of compounds that will be used in Building T-27, Lilly assumed that any one of the following compounds could be emitted (acetonitrile, acetophenone, benzyl chloride, biphenyl, carbon disulfide, chlorobenzene, chloroform, dimethylformamide, ethylene dichloride, ethylene glycol, formaldehyde, hexane, hydrochloric acid, methanol, MEK, methyliodide, methyl isobutyl ketone, methyl tert-butyl ether, methylene chloride, phenol, toluene, triethylamine, xylenes cyanide compounds and glycol ethers). The potential to emit for combined HAPs from the three tanks are emitted at 121.62 tons per year (Gen'l Tank 33-1, 86.03; Gen'l Tank 43-1, 31.53; and Pt-3, 4.06) before control. The source is requesting a single HAP limit of less than 10 tons per year, and combined HAPs to less than 25 tons per year. The existing scrubbers will control the inorganic HAPs, which has a control efficiency of 95%. The existing RTO will control the organic HAPs, which has a control efficiency that meets and exceeds the requirements of 326 IAC 8-5-3.

Conclusion

The operation of the process tanks Gen'l Tank 33-1, and Gen'l Tank 43-1 and portable Gen'l Tank PT-3 shall be subject to the conditions of the attached proposed **Minor Source Modification 157-11183-00006.**

Emissions Calculations

Source Location: 1650 Lilly Road, Shadeland, Indiana 47905
County: Tippecanoe
SIC Code: 2834 & 2879
Operation Permit No.: TV157-6879-00006
Operation Permit Issuance Date: Pending
Minor Source Modification No.: 157-11183-00006
Permit Reviewer: Aida De Guzman

Eli Lilly and Company has submitted an application relating to the installation of new process tanks, identified as Genl Tank 33-1, with a capacity of 2,000 gallons, for a like-kind replacement of the old process tank; Genl Tank 43-1 with a capacity of 1,000 gallons, to replace a 750 gallon process tank; and a portable Genl tank PT-3 with a capacity of 100 gallons, all in building T27. The volatile organic compounds (VOC) emissions from these tanks will be controlled directly by the existing Regenerative Thermal Oxidizer (RTO) permitted under Construction Permit CP157-1980).

The point source emissions from these process vessels may vent directly to the RTO, or they may first vent to scrubbers, process control condensers, vacuum sources, or through other process vessels before going to the RTO. If venting the process vessel to the RTO would cause a safety concern, the process vessels may vent to an alternative pollution control device. Also, in the event that the RTO is unavailable, Lilly would continue manufacturing operations in the process vessels using other existing pollution control equipment that complies with 326 IAC 8-5-3. The carbon monoxide emissions from these replacement tanks will be voluntarily controlled by the RTOs. The sulfur dioxide emissions from these replacement tanks will be voluntarily controlled by scrubbers. The nitrogen oxides emissions from these replacement tanks will be voluntarily controlled by scrubbers.

Process Description:

The process vessels can be used in a variety of operations involved in pharmaceutical manufacturing. These operations can be of batch or continuous nature and include, but are not limited to: heating, cooling, distilling (atmospheric and vacuum), extracting, crystallizing, chemical synthesis, cryogenic service, and their associated operations.

The process used to model the emissions from the general process vessels is a worst case process designed to give a maximum emissions estimate for any process that may be run in this piece of equipment. While general process vessels are only used in the production of bulk pharmaceutical drugs, the type of products manufactured will vary with the market demand.

Emissions calculations for point source VOC emissions from all tanks were performed by the applicant, using the equations found in the EPA guideline for control of volatile organic compounds emissions from manufacture of synthesized pharmaceutical products, EPA-450/2-78-029. To estimate the maximum potential uncontrolled and allowable VOC emissions for each piece of equipment, acetone was used as solvent in the emission calculations and 8760 hours/year operating schedule was assumed to get a worst case potential emissions scenario. Acetone although a non-photochemically reactive hydrocarbon, was used in the calculations because it has the highest volatility among the solvent utilized. Since solvents with vapor pressures as high as that of acetone are not always used in the processes, the assumption used in the calculations will generate a worst case estimate for the potential VOC emissions.

For this application, the VOC emissions estimate from all tanks is based on a combination of the typical unit operations that are done to perform a process. The process steps in the model for tanks include charging, heating, atmospheric and vacuum distillations. The process used to model the VOC emissions from the tanks is a worst case process designed to give a maximum emissions estimate for any process that may be run in the tank. For example, a distillation process can include a tank

evacuation, a heating, and distillation steps.

The emission calculations assume the control device is a condenser with exit gas temperature of -150C. This demonstrates that the control efficiency required to comply with 326 IAC 8-5-3 is approximately 90 percent. The RTO is designed to achieve more than 95 percent reduction of the VOC

emissions which will meet the requirements of 326 IAC 8-5-3. When condensers are used to control VOC emissions, these condensers will achieve an efficiency of 90%. The various assumptions used in calculating emissions from different process activities may be found with the relevant equations in the sample calculations. For this application, the process tank VOC emission estimates are based on a combination of the typical unit operations that are done to perform a process. The steps in the model process include charging, heating, tank evacuation with vacuum distillations, and atmospheric distillations. For example, a distillation process can include a tank evacuation, a heating step, and a distillation step. For all processes, acetone a non-photochemically reactive hydrocarbon was used in the calculations, since it has the highest volatility among the solvent being utilized.

During distillation operations, the condenser on a process vessel is not considered to be a pollution device. It is classified as a process control device because it is vital to production of the normal product of the distillation. No other process operations will have condensers as the pollution control device.

The calculations for the controlled point source VOC emissions from the process tank assumes that the pollution control device is a condenser (exit gas temperature -150C). The VOC emissions leaving the condensers are calculated assuming ideal liquid and vapor in equilibrium at a given temperature and pressure.

Potential uncontrolled fugitive emissions were estimated using SOCMI factors by the applicant. Potential controlled fugitive emissions were estimated based on LDAR factors included in the revised Lilly LDAR Program most recently approved by IDEM.

Process Vessel Calculation Assumption:

1. Pure acetone is used in all calculations.

2. The vessel contains perfectly mixed ideal liquid and vapor phases, and they are continuously in phase equilibrium.

3. The vapor leaving the vessel is assumed to have the same composition as the vapor in the tank's vapor space.

4. The streams leaving the condensers, where used, are calculated assuming ideal liquid and vapor in equilibrium at the given temperature and pressure.

5. The amount of liquid being vaporized in the tank is assumed to be small compared to the total liquid volume. Therefore, the liquid composition and the volume of the vapor space can be assumed to be constant.

6. The control device is a condenser that will produce an exit gas temperature of -150C (per 326 IAC 8-5-3 for acetone)under all loading, or an equivalent control device that will have the same control efficiency as this condenser.

7. VOC emissions are from the tanks themselves, not ancillary existing equipment.

8. Nitrogen purge rate for inerting purposes is 5 scfh.

9. Charging into a tank is at 60 gallons per minute.

10. Tanks are charged 2/3 full of acetone for all tank sizes.

11. The tank is assumed to start each operation 2/3 full, except for "charging" where the tank is empty at the start. The vapor space is assumed to be composed of gaseous N2 in equilibrium with acetone vapor at the stated temperature.

12. The atmospheric distillation involves heating the tank contents (pure acetone) to its boiling point, then distilling over of the liquid volume.

13. During the atmospheric distillation, there are two condensers. The first is a process control condenser that produces an exit gas temperature of 230C(550F cooling water = 12.780C + 100C

approach = 22.78 ~ 230C). The emissions from this condenser are listed in the potential uncontrolled column. The second is an emissions control condenser that produces an exit gas temperature of -150C, or a control device with the same control efficiency. The emissions from this condenser are listed in the potential controlled column.

14. There is a 5 scfh nitrogen purge during all atmospheric distillations.

15. "Evacuation" means evacuating the tank from atmospheric pressure down to 1 mmHg above the vapor pressure of acetone at 200C.

16. The vacuum distillation inert leak rate is 0.5 scfm for all tank sizes and vacuum levels. This is the average leak rate.

17. The vacuum distillation involves evacuating the tank from atmospheric pressure to acetone's vapor pressure at 200C, then distilling over of the liquid volume.

18. During the vacuum distillation, there are two condensers. The first is a process control condenser that produces an exit gas temperature of 00C (-100C brine + 100C approach = 00C). The emissions from this condenser are listed in the potential uncontrolled column. The second is an emissions control condenser that produces an exit gas temperature of -150C, or a control device with the same control efficiency. The emissions from this condenser are listed in the allowable column.

19. The pressure transfer operation consists of pressuring-up the tank with nitrogen from 1 to 2 atmosphere to force the liquid out of the tank. When the tank is empty, this pressure is released from the tank.

20. There are no process condensers on the purge, charge, heat from 200C to 550C, evacuation, or de-pressurization steps. A condenser is not needed to perform these operations.

21. It is assumed that during the time the tank is not performing a set of steps that it can be doing another operation that the 24 hour sweep will account for that operation's emissions, i.e., stirring, cooling.

22. "Per step" emissions are for performing the given step, or series of steps, once.

23. "Yearly" emissions are for performing the given step, or series of steps, once per day, 365 days per year.

24. For the sets of steps listed under "potential process chain for 1 day", each set is performed independently of the previous and next set of steps. The time required to perform each set of steps is also listed, then summed. It is also assumed that this process chain is only performed once per day.

Calculation Nomenclature

a,b,c - Antoine coefficients
i - The ith. component
Kideal - Vapor/liquid equilibrium constant
LMPD - Log mean pressure difference (mm Hg) L
- Total moles in liquid phase (lb-mole)
Li - Moles of component i in liquid phase (lb-mole)
M - Mass(lb)
Mi - Mass of component i (lb)
m - Mass rate (lb/hr)
mi - Mass rate of component i (lb/hr)
MW - Molecular weight (lb/lb-mole)
MWi - Molecular weight of component i (lb/lb-mole)
N or V - Total moles in vapor phase (lb-mole)
n - Molar rate (lb-mole/hr)
Ni or Vi - Moles of component i in vapor phase (lb-mole)
ni - Molar rate of component i (lb-mole/hr)
P or Ptotal - Total Pressure (mm Hg)
Pi - Partial pressure of component i (mm Hg)
p0 - Vapor pressure (mm Hg)
pi0 - Vapor pressure of component i (mm Hg)
R - Ideal Gas Constant (10.73 ft3 psia/lb-mole 0R)
T - Temperature in Kelvin (K) or Rankine(R)
t - Temperature in Celsius (C) or Fahrenheit (F)
V - Volume (ft3)
V or N - Total moles in vapor phase (lb-mole)
Vi or Ni - Moles of component i in vapor phase (lb-mole)
v - Volumetric rate (gpm for liquid, cfm for vapor or gas)
xi - Liquid mole fraction of component i
yi - Vapor mole fraction of component i
Z - Total moles entering condenser (lb-mole)
Zi - Total moles of component i entering condenser (lb-mole)

Sample calculations for VOC emissions:

Physical Properties:

Acetone: Nitrogen(gaseous):
Molecular weight = 58.08 Molecular weight = 28
Antoine Coefficients (-59.40C to 56.50C)
a = 16.82
b = 2993
c = -35.63
Specific gravity @ 200C = 0.792

Possible Operation Step A: N2 inerting purge @ 5 scfh

Tanks that contain a flammable liquid(s) or a VOC(s) are purged with gaseous N2 to keep the vapor space above the liquid inert. As a continuous stream of N2 flows into the tank, N2 becomes saturated with vapor that is in equilibrium with the liquid. An emission is created as this N2/vapor mixture leaves the tank.

Liquid temperature = 293.150 K (200C)
Vessel Pressure = 760 mm Hg

Pure acetone is in the tank during this step, so the mole fraction of liquid component (xA) is 1.

Potential uncontrolled VOC emissions:

Vapor pressure calculation: Using the Antoine Equation at liquid temperature (200C),

$$\ln(pAO) = [a-(b/(T(0K)+c))]$$
$$pAO = \exp [a-(b/(T(0K) + c))]$$
$$= \exp [16.82 - (2993/(293.15 - 35.63)]$$
$$= 180.84 \text{ mmHg}$$

Equilibrium Concentration: Raoult's Law states that the partial pressure of acetone, PA, can be calculated by multiplying the vapor pressure, pAO, by the
liquid mole fraction, xA, which equals the total pressure, P, multiplied by the vapor mole fraction, yA.

$$(P)(yA) = (pAO)(xA) = PA$$

Rearranging yields:

$$yA/xA = pAO/P = Kideal$$
$$YA = (Kideal)(xA)$$
$$= (180.84/760)(1)$$
$$= 0.2379$$

Inert Sweep Rate: It is assumed that the amount of N2 entering the tank leaves
the tank at the same rate. It is assumed that the N2 stream enters the tank at 700F (5300R) and 14.72 psia. Using the ideal gas law;

$$PV = nRT$$
$$PV = (m/MW)RT \text{ Since: } n = m/MW$$
$$m = PV(MW)/RT$$

The mass flow rate, m, is:

$$mN2 \text{ (lb/hr)} = \{v(cfh)(MWN2)(14.72 \text{ psia})\}/(R)(5300R)$$
$$= \{(5 \text{ scfh})(28)(14.72 \text{ psia})\}/(10.73)(5300R)$$
$$= 0.3624 \text{ lb/hr}$$

For 24 hours:

MN2 (lb) = (0.3624 lb/hr)(24 hrs)
= 8.70 lb

Mass of acetone leaving the system: The number of moles of volatile components leaving the tank is related to the number of moles leaving the system and the partial pressure of the volatile and inert compounds. For a one component system:

(PA)(v) = (nA)(R)(T)

For the inert sweep, v, R, and T are assumed constant. Therefore, the ratio of moles of inert to volatile compounds can be calculated as:

PA/PN2 = nA/nN2 Since: nN2 = mN2/MWN2
= (nA)(MWN2)/mN2)
= (mA)(MWN2)(mN2)(MWA) Since: nA = mA/MWA
PA/(P-PA) = (mA)(MWN2)/(mN2)(MWA) Since: PN2 = P-PA

The mass rate of acetone vapor emitted by the N2 sweep is:

mA(lb/hr) = (mN2/MWN2)(MWA)(PA/(PA-P))
= (0.3624/28)(58.08)(180.84/(760-180.84))
= 0.2347 lb/hr

For 24 hours:

MA (lb) = (0.2347 lb/hr)(24 hrs)
= 5.63 lb

Maximum controlled VOC emissions (per 326 IAC 8-5-3):

Potential controlled emissions are based on emissions from the emission control device. In these calculations it is assumed to be a surface condenser that produces an exit vapor temperature of -150C, to ensure compliance with 326 IAC 8-5-3 for acetone.

Vapor pressure calculation: Using the Antoine Equation at -150C,

ln (pA(mmHg)) = [a-(b/(T(0K)+c))]

pA(mmHg) = exp [a-(b/(T(0K) + c))]
= exp [16.82 - (2993/(258.15 - 35.63)]
= 29.06 mmHg

Kideal = 29.06/760 = 0.0382

The total number of moles entering the condenser is equal to the sum of the liquid and vapor moles leaving the condenser:

Z = V + L

Likewise for each component:

Zi = Vi + Li Where Li = 0 for inert

or Zi = (V)(yi) + (L)(xi) for volatile compounds

Zi = (V)(yi) for inert compounds

Zi = (V)(Kideal)(xi) + (L)(xi) Since Kideal = yi/xi

Zi/L = (V/L)(Kideal)(xi) + (xi)

Zi/L = [(V/L)(Kideal) + 1](xi)

Zi/[(V/L)(Kideal) + 1] = (L)(xi) = Li

$$Li = Zi/[(V/L)(Kideal) + 1]$$

To solve the mass balance for the number of moles in the liquid and vapor phases:

1. Assume a V/L ratio(where V is total molar volume including the inert gases)

2. Calculate the liquid moles of each volatile component by:

$$Li = Zi/[(V/L)(Kideal) + 1]$$

3. Calculate the vapor moles of each volatile component by:

$$Vi = Zi - Li$$

4. The moles of inert out of the condenser is equal to the moles into the condenser, which has been calculated previously.

5. Sum the volatile component liquid moles (L) and the volatile and inert component vapor moles (V) and compute the ratio V/L.

6. The computed V/L is compared to the assumed V/L. If they are not equal, a new iteration is performed using the calculated V/L.

The following table shows the values used for the iteration:

Iteration	Assumed '	Calculated	VN2	Calculated V/L	
1	0.5	0.0952	0.0018	0.3106	3.28
2	3.28	0.0862	0.0108	0.3106	3.73
3	3.73	0.0849	0.0121	0.3106	3.8
4	3.8	0.0847	0.0123	0.3106	3.81
5	3.81	0.0847	0.0123	0.3106	3.81

The mass of each component is related to its moles by:

$$Mi(lbs) = (Vi)(MWi)$$

$$MA(lbs) = (0.0123)(58.08)$$
$$= 0.71 \text{ lb}$$

Possible operation Step B: Charge 2000 gallon tank 2/3 full:

This calculation models the emissions associated with the displacement of vapor from a tank that is being filled with a VOC. The tank in this case is filled 2/3 full with acetone at 200C at 60 gallons per minute. The tank is assumed to be filled with gaseous N2 before charging, and the displaced vapor is N2, 100 % saturated with acetone.

Liquid temperature = 293.150K (200C)
Tank pressure = 760 mmHg

Pure acetone is charged into the tank during this step, so the mole fraction of liquid component (xA) is 1.

Potential VOC emissions:

Volume of charged material:

VL = (2000 gallons)(2/3) = 1333.33 gallons
= (2000 gal)(1ft3/7.4805 gal)(2/3) = 178.24 ft3

This is also the volume of inert being displaced.

Molar displacement rate of inert:

The volatile and inert vapor partial pressures are related by:

PTotal = PA + PN2

The partial pressure of N2 is then:

PN2 = PTotal - PA
= (760)- (180.84)
= 579.16 mmHg
= (579.16 mmHg)(14.696 psia/760 mmHg)
= 11.20 psia

Applying Dalton's Law:

nN2 = (PN2)(VL)/[(R)(T)]
= (11.20 psia)(178.24 ft3)/((10.73)(527.67))
= 0.3526 lbmoles

Mass of Acetone leaving the tank:

The mass rate of acetone vapor emitted by the liquid displacement:

MA(lb) = (MN2)(MWA)(PA /PN2))
= (0.3526)(58.08)(180.84)/(579.16)
= 6.39 lbs

Maximum controlled VOC emissions under rule 326 IAC 8-5-3:

Potential controlled VOC emissions are based on emissions from the control device. In these calculations it is assumed to be a surface condenser that produces an exit vapor temperature of -150C.

The total number of moles entering the condenser is equal to the sum of the liquid and vapor moles leaving the condenser. This calculation is identical in method to Step A's (N2 inerting purge @ 5 scfh) Potential Controlled calculation method.

The resulting VA of the iterative calculation is: 0.0140

The mass of each component is related to its moles by:

Mi(lbs) = (Vi)(MWi)

MA(lbs) = (0.014)(58.08)
= 0.81 lbs

Possible operation Step C: Heat tank contents from 200C to 550C:

This calculation models the emissions associated with the displacement of vapor from acetone that is being heated from 200C to 550C. The vapor space above the liquid is assumed to consist of gaseous N2 saturated with acetone vapor. As the liquid heats up, it vaporizes and displaces the vapor above it, causing an emission from the tank.

Initial liquid temperature = 293.150K (200C, 527.670R)
Final liquid temperature = 328.150K (550C, 626.670R)
Tank pressure = 760 mmHg

Volume of acetone in tank:

VL = (2000 gallons)(2/3) = 1333.33 gallons
= (1333.3 gallons)(1 ft3/7.4805 gal)(2/3) = 178.24 ft3

Volume of vapor space:

VVS = (2000 gallons)(1/3) = 666.67 gallons
= (666.67 gallons)(1 ft3/7.4805 gal)(1/3) = 89.12 ft3

Pure acetone is in the tank during this step, so the mole fraction of liquid component (xA)is 1.

Potential VOC emissions:

Vapor Pressures: Initial and final vapor pressures are calculated using the Antoine equations as previously shown.

Initial:

Acetone, p0A,I = 180.84 mmHg (3.50 psia) KIdeal,I = 0.2379
Nitrogen, p0N2,I = 579.16 mmHg (11.20 psia)

Final:

Acetone, p0A,F = 726.49 mmHg (14.05 psia) KIdeal,F = 0.9559
Nitrogen, p0N2,F = 33.51 mmHg (0.65 psia)

Change in moles of inert in vapor space between initial and final conditions:

$$N_{N2,I} - N_{N2,F} = [((P_{N2,I})/(T_I)) - ((P_{N2,F})/(T_F))](V_{VS})/(R)$$
$$= [((11.20)/(527.67))-((0.65)/(626.67))](89.12)/(10.73)$$
$$= 0.1677 \text{ lbmoles}$$

Amount of acetone being displaced from the tank:

The total number of moles in the vapor space and the vapor phase composition are both functions of temperature. Since the molar rate at which vapors leave the tank is greatly influenced by the components partial pressure, it is assumed that for any component:

$$N_i / (LMPD)_i = \text{Constant}$$

Where Ni is the number of moles of component i having left the tank.

The Log Mean Pressure Difference of i, (LMPD)i, is calculated as follows:

$$(LMPD)_i = (P_I - P_F)_i / \ln(P_I/P_F)_i$$

$$(LMPD)_A = (180.84 - 726.49)_A / \ln(180.84/726.49)_A$$
$$= 392.38$$

$$(LMPD)_{N2} = (579.16 - 33.51)_{N2} / \ln (579.16/33.15)_{N2}$$
$$= 190.75$$

Therefore, the number of moles of acetone can be estimated by:

$$N_A = (N_{N2})(LMPD)_A /(LMPD)_{N2}$$

And the mass of acetone leaving the tank is:

$$M_A \text{ (lbs)} = (N_{N2})[(LMPD)_A /(LMPD)_{N2}](MW_A)$$
$$= (0.1677)[(392.38)/(190.75)](58.08)$$
$$= 20.04 \text{ lb}$$

Maximum Controlled VOC Emissions (under 326 IAC 8-5-3):

Potential controlled VOC emissions are based on emissions from the control device. In these calculations it is assumed to be a surface condenser that produces an exit vapor temperature of -150C.

The total number of moles entering the condenser is equal to the sum of the liquid and vapor moles leaving the condenser. This calculation is identical in method to Step A's (N2 inerting purge @ 5 scfh) Potential controlled calculation method.

The resulting VA of the iterative calculation is: 0.0067

The mass of each component is related to its moles by:

Mi (lbs) = (Vi)(MWi)

MA (lbs) = (0.0067)(58.08)
= 0.39 lbs

Possible Operation Step D: Atmospheric Distillation

The atmospheric distillation involves heating the tank contents (pure acetone) to its boiling point, then distilling over of the liquid volume. During the atmospheric distillations, there are two condensers. The first is a process control condenser that produces an exit gas temperature of 230C (550F cooling water = 12.780C + 100C approach = 22.780C ~ 230C). The second is an emission control condenser that produces an exit gas temperature of -150C, or a control device with the same control efficiency.

Heating acetone to its boiling point is modeled using the method outlined in Step C (Heat tank contents from 200C to 550C). The distillation is modeled using the method outlined in Step A (N2 inerting purge @ 5 scfh) with an additional "potential controlled emissions" calculation because there are two condensers as explained above.

Possible Operation Steps E & F: Vacuum Distillation

The Vacuum distillation involves evacuating the tank from atmospheric pressure to acetone's vapor pressure at 200C , then distilling over of the liquid volume. Because the system is under vacuum, and it is not perfectly sealed, air leaks into the system. During the vacuum distillation, there are two condensers. The first is a process control condenser that produces an exit gas temperature of 00C (-100C brine + 100C approach = 00C). The second is an emission control condenser that produces an exit gas temperature of -150C, or a control device with the same control efficiency.

Evacuating the tank to acetone's boiling point (at 200C) is modeled using the method outlined below. The air leakage during the distillation is modeled using the method outlined in Step A (N2 inerting purge @ 5 scfh) with an additional "potential controlled emissions" calculation because there are two condensers as explained above.

Liquid temperature = 293.15 K (200C, 527.670R)
Initial tank pressure = 760 mmHg

Volume of acetone in tank:

VL = (2000 gallons)(2/3) = 1,333.33 gallons
= (2000 gallons)(1 ft3/7.4805 gallons)(2/3) = 178.24 ft3

Volume of vapor space:

VVS = (2000 gallons)(1/3) = 666.67 gallons
= (2000 gallons)(1 ft3/7.4805 gallons)(1/3) = 89.12 ft3

Pure acetone is in the tank during this step, so the mole fraction of liquid component (XA) is 1.

Potential VOC emissions:

Vapor Pressures: Calculated using the Antoine equations as previously shown.

Initial:

Acetone, p0A,I = 180.84 mmHg Kideal,A = 0.2379

Nitrogen, p0N2,I = 579.16 mmHg

Mass of N2 evacuated from tank: Since the vapor pressures of acetone and N2 are constant, as well as the vapor space and temperature, the moles of acetone also remain constant, i.e., as any acetone vapor leaves the system, it is replaced by an equal amount from the liquid phases. The decrease in pressure, therefore, is due to the evacuation of N2. The number of moles of N2 leaving the system are calculated by:

$$(N_{N2,Initial} - N_{N2,Final}) = (P_{Initial} - P_{Final})(VVS)/[(R)(T)]$$

$$= ((14.696 - 3.5)(89.12)/(10.73)($$

$$= 0.1762 \text{ lbmoles}$$

Mass of Volatiles evacuated from tank: Using the LMPD method as described in Step C (Heat tank contents from 200C to 550C) the mass of acetone leaving the tank is calculated by:

$$(LMPD)_{N2} = (P_I - P_F)_{N2} / \ln(P_I/P_F)_{N2}$$

$$= (579.16 - 0.16) / \ln (579.16/0.16)$$

$$= 70.66$$

$$MA \text{ (lbs)} = [(N_{N2})/(LMPD)_{N2}](MW_A)(P_A)$$

$$= [(0.1762)/(70.66)](58.08)(180.84)$$

$$= 26.19 \text{ lb}$$

Maximum Controlled VOC Emissions (under 326 IAC 8-5-3):

Potential controlled emissions are based on emissions from the control device. In these calculations it is assumed to be a surface condenser that produces an exit vapor temperature of -150C.

The total number of moles entering the condenser is equal to the sum of the liquid and vapor moles leaving the condenser. This calculation is similar to Step A's (N2 inerting purge @ 5 scfh) potential controlled calculation method.

The resulting VA of the iterative calculation is: 0.0337

The mass of each component is related to its moles by:

$$M_i(\text{lbs}) = (V_i)(MW_i)$$

$$MA(\text{lbs}) = (0.0337)(58.08)$$

$$= 1.96 \text{ lb}$$

VOC Point Source Emissions Estimate for Genl Tank 43-1(1000 Gallon)

Possible C	Temp(0C)	VOC Emissions lb/step		PU		PC					
A. N2 iner	20 20 20-	5.73	0.73	3.2	0.41	9.94	0.19	23.19	0.20	0.86	0.0
Possible Process Ch		VOC Emis	VOC Emissions tons/yr		PU		PC				
1.Charge-\	B-E-F-G B	28.5 4.8 3	5.2	0.87	5.7	0.27	3.13	0.26	3.13	0.26	1.3 0.21 1.05 0.13
Total (lb/day)	Total (T	107.03 11.	19.5	2.02							

PU - Potential emissions before pollution control device
PC - Potential controlled emissions. Control device is a vent condenser or equivalent controls to meet 326 IAC 8-5-3 requirements.

VOC Point Source Emissions Estimate for Genl Tank 33-1 (2000 Gallon)

Possible C	Temp(0C)	VOC Emissions lb/step		PU		PC					
A. N2 iner	20 20 20-	5.73	0.73	6.39	0.81	19.89	0.39	46.39	0.41	1.72	0.18 26.15 1.96 16.42 5.2
Possible Process Ch		VOC Emis	VOC Emissions tons/yr		PU		PC				
1.Charge-\	B-E-F-G B	57.00 9.	10.4	1.75	11.4	0.55	6.26	0.51	6.26	0.51	2.63 0.44 1.05 0.13
Total (lb/day)	Total (T	208.4 21.3	38.03	3.90							

VOC Point Source Emissions Estimate for Portable Genl Tank PT-3 (100 Gallon)

Possible C	Temp(0C)	VOC Emissions lb/step		PU		PC					
A. N2 iner	20 20 20-	0.573	0.73	0.32	0.04	1.0	0.02	2.34	0.020	0.07	
Possible Process Ch		VOC Emis	VOC Emissions tons/yr		PU		PC				
1.Charge-\	B-E-F-G B	2.71 0.44	0.49	0.08	0.57	0.027	0.313	0.026	0.313	0.026	0.129 0.022 1.045 0.133
Total (lb/day)	Total (T	15.69 1.72	2.86	0.31							

Genl Tank 43-1 (1,000 gallons) Replacement Fugitive Emissions

FUGITIV	POTENTIAL UNCONTROLLED FUGITIVE EMISSIONS			
	QUANTIT	SOCMI FA	EMISSIONS	
			lb/day	ton/yr
AGITATOI	1	0.10891	2.61	0.48
FLANGES	14	0.00183	0.6149	0.1
VALVES	0	0.01565	0	0
TOTAL			3.22	0.58

FUGITIV MAXIMUM CONTROLLED FUGITIVE EMISSIONS

	QUANTIT	LDAR FAC	EMISSIONS lb/day	ton/yr
AGITATOI	1	0.00497	0.12	0.02
FLANGES	12	0.0007	0.2342	0.04
VALVES	0	0.00146	0	0
TOTAL	0.353	0.06		

Genl Tank 33-1(2,000 gallons) Replacement Fugitive Emissions

FUGITIV POTENTIAL UNCONTROLLED FUGITIVE EMISSIONS

	QUANTIT	SOCMI FA	EMISSIONS lb/day	ton/yr
AGITATOI	1	0.10891	2.61	0.48
FLANGES	12	0.00183	0.527	0.11
VALVES	0	0.01565	0	0
TOTAL			3.14	0.57

FUGITIV MAXIMUM CONTROLLED FUGITIVE EMISSIONS

	QUANTIT	LDAR FAC	EMISSIONS lb/day	ton/yr
AGITATOI	1	0.00497	0.12	0.02
FLANGES	12	0.0007	0.218	0.04
VALVES	0	0.00146	0	0
TOTAL	0.338	0.06		

Portable Genl Tank PT-3 (100 gallons) Fugitive Emissions

FUGITIV POTENTIAL UNCONTROLLED FUGITIVE EMISSIONS

	QUANTIT	SOCMI FA	EMISSIONS lb/day	ton/yr
AGITATOR PUMPS		0.10891	0	0
FLANGES	10	0.00183	0.4392	0.08
VALVES	0	0.01565	0	0
TOTAL			0.4392	0.08

FUGITIV MAXIMUM CONTROLLED FUGITIVE EMISSIONS

	QUANTIT	LDAR FAC	EMISSIONS lb/day	ton/yr
AGITATOI	0	0.00497	0	0
FLANGES	10	0.0007	0.1673	0.03
VALVES	0	0.00146	0	0
TOTAL	0.1673	0.03		

CALCULATION ASSUMPTIONS:

1. Fugitive emissions are calculated assuming the tanks are in service 24 hrs per day and 365 days per year.
2. Potential Fugitive Emissions are calculated using the SOCMI factors (lb/hr).
3. Maximum Controlled Fugitive Emissions are calculated based on the factors in the LILLY LDAR Program approved by IDEM.
4. The 2000 gallon tank has 12 flanges and 1 agitator; with 10% safety factor 13 flanges and 1 agitator.
5. A 10% safety factor was added to the number of fugitive sources for flanges and valv to allow for piping modifications.

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Potential Uncontrolled VOC Emissions

Tank Size	Tank #	Point Sour	Fugitive Ei	Total Emissions (tons/yr)
2000	Genl Tank	38.03	0.57	38.6
1000	Genl Tank	19.53	0.6	20.1
100	Portable G	2.86	0.08	2.94

Total	60.42	1.25	61.64

The RTO alone has been demonstrated to achieve in excess of 97% VOC reduction which is more than that required by 326 IAC 8-5-3. The control efficiency achieved by the condenser under 326 IAC 8-5-3 (with -150C exit gas temperature) is approximately 90%.

Maximum Controlled or Allowable (Based on 8-3-5) VOC Emissions from Tanks

Tank Size	Tank #	Point Sour	Fugitive Ei	Total Emissions (tons/yr)
2000	Genl Tank	3.9	0.06	3.96
1000	Genl Tank	2.02	0.06	2.08
100	Portable G	0.31	0.03	0.34
Total		6.23	0.15	6.38

SO2, NOx, and CO emissions estimates from each tank

SO2, NOx, and CO emissions may also be emitted from each of the process vessels. There may be processes run where these pollutants are emitted from a gas evolving process step. Based on the applicants knowledge of the processes run at Tippecanoe laboratories, three different reactions were chosen to obtain an estimate of the SO2, NOx, and CO emissions. Each reaction is the highest known emitter of the respective pollutant it emits. There are fewer processes that emit SO2, NOx, and CO than VOCs. Therefore, 100 lots per year were used in the worst case potential emissions calculation. This maximum emission rate is much higher than any tank itself will emit, but because it is difficult to estimate how much of the emissions can be attributed to each tank alone, the entire building emission is assumed to come from each tank itself. As stated earlier, when summing the total emissions this factor is taken into account by looking at the maximum emitting tank for each building.

Assumptions

1. Assume 100 lots/yr for processes, in all the tanks emitting these pollutants.

Emissions calculations for SO2

Based on the stoichiometry from process with worst case SO2 emissions:

$SOCl_2 + H_2O = SO_2 + 2\ HCl$

Potential SO2 Emissions = (1023 Kg SOCl2/lot)*(Kgmol of
from Genl Tank 33-1 (2000 gallons) SOCl2/ 119 Kg)*(Kgmol of SO2/Kgmol
of SOCl2)* (64.0 Kg SO2/Kgmol of SO2) *(2.2 lb/1 Kg)
= 1212 lb/lot
= (1212 lb SO2/lot)*(1
(1 ton/200

Potential SO2 Emissions = (1212 lb SO2/lot)*(100 lot/yr)* (1 ton/2000 lb)
from Genl Tank 43-1 (1000 gallons) * 1,000 gallons/2000 gallons
= 30.30 tons/yr

Potential SO2 Emissions = 100 gallon/1000 gallons * 30.30 ton/yr
from Genl Tank PT-3 (100 gallons) = 3.03 ton/yr

SO2 Limitation:

< 25 tons/yr * 2000 lb/ton * 1 lb-mole SO2 / 64.06 lb SO2 = < 780 lb-mole SO2
Note: 780 lb-mole equivalents, where one lb-mole equivalent is the amount of SCC (sulfur containing compound) that reacts to form one lb-mole SO2.

Emission Calculations for CO:

Process basis: Process INT

Maximum lots/yr = 100 lots

Based on test data from process with worst case CO emissions. The test data was performed on a 1:20,000 scale basis for a process run in a 2000 gallon scale building.

The process uses 63.5 grams of COCl2.

Assume all is converted to CO (this is a very conservative assumption.)

(63.5 g COCl2/lot)(28 g/mole CO/98.92 g/mole COCl2)(lb/454 g)

= 0.0396 lb CO/lot

CO Emissions from Genl Tank 33-1:
(0.0396 lb CO/lot)*(20,000 building size/1 sample size)*
(100 lots/yr)*(ton/2000 lb) = 39.6 tons CO/yr (uncontrolled)

CO Emissions from Genl Tank 43-1:
1000 gallon/2000 gallons * 39.6 tons CO/yr = 19.77 tons/yr (uncontrolled)

CO Emissions from Portable Genl Tank PT-3:
100 gal/1000 gal * 19.77 ton CO/yr = 1.98 tons/yr (uncontrolled)

The source voluntarily controls the CO emissions

UNCONTROLLED EMISSION SUMMARY (TONS/YR)

PROCESS	CAPACITY	VOC	CO	SO2	NOX	INORGAN	ORGANIC	TOTAL COMBINED HAPS
GENL TAN	2,000	38.03	39.55	60.6	3.39	48	38.03	86.03
GENL TAN	1,000	19.53	19.77	30.3	1.7	12	19.53	31.53
GENL TAN	100	2.86	1.98	3.03	0.17	1.2	2.86	4.06
TOTAL		60.42	61.3	93.93	5.26	61.2	60.42	121.62

CONTROLLED EMISSION SUMMARY (TONS/YR)

PROCESS	CAPACITY	VOC	CO	SO2	NOX	SINGLE H	COMBINED HAPS
GENL TAN	2,000	3.9	39.55	60.6	3.39	48	51.9
GENL TAN	1,000	2.02	19.77	< 25	1.7	<10	<25
GENL TAN	100	0.31	1.98		0.17		
TOTAL		6.23	61.3	< 85.6	5.26	<58.0	<76.90

(527.67)

)9 13.

24 8.04

0.01

ves only

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l00 lot/yr)*
0 lb)
 = 60.60 tons/yr